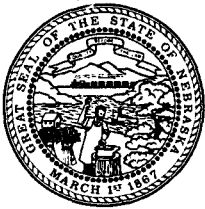


# STATE OF NEBRASKA

RCOM  
GEO



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AUG 22 1994

RCOM SECTION

DEPARTMENT OF ENVIRONMENTAL QUALITY

Randolph Wood

Director

Suite 400, The Atrium

1200 N Street

P.O. Box 98922

Lincoln, Nebraska 68509-8922

Phone (402) 471-2186

E. Benjamin Nelson  
Governor

Certified Mail

NED 04410442

AUG 08 1994

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AUG 19 1994

USEPA, RCRA Branch

Lockwood Corporation  
Mr. Robert S. Jacobson  
Technical Services Director  
Highway 92 East  
P.O. Box 160  
Gering, Nebraska 69341

RE: Hazardous Waste Operation Maintenance Inspection  
NDEQ/EPA Identification Number: NED044101442

## Notice of Violation

Dear Mr. Jacobson:

Enclosed is a copy of the Operation Maintenance Inspection (OMI) conducted at your facility on November 10, 1993. Please direct your attention to the Conclusions section of the report.

This inspection identified several areas of non-compliance. Violations and associated Post-closure Permit Conditions are as follows:

1. Well number labels are peeling off. Permit Condition IV.B.
2. The threaded portion of the PVC stick-up of at least one well is broken. Permit Condition IV.B.
3. The background monitoring system lacks a defined background well. MW-8 may serve this purpose, or a new well MW-9 may be installed on-site south of MW-8. Permit Condition IV.V.1.a.
4. Monthly wellhead inspections, annual well bore scrape sampling, and annual review of well yield, recover time, and fill depth have not occurred. Permit Condition IV.V.2.a.
5. The Sampling and Analysis Plan (SAP) is insufficient. Permit Condition IV.E. See specifics in Section E. 2, 4, 6, and 10.
6. The wells lack survey marks from which to measure depth to water. Permit Condition IV.F.
7. The 9/89 Sampling event did not result in analysis for nitrate-nitrogen or fluoride. Permit Condition IV.D.1.
8. 9/89 MW-7 exceedances on silver did not result in coring the top 5 feet of the Brule Formation. Permit Condition IV.D.2.
9. Lockwood does not sample using a disposable bailer for immiscible analysis. Permit Condition IV.E.1.a.1.
10. Lockwood does not record well yield and recover time during and after purging. Permit Condition IV.E.1.a.3.



R00020707

RCRA Records Center

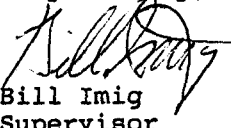
11. Chain-of-custody documents are not completed during sampling. Permit Condition IV.E.4.
12. No background values are listed in the Permit Application for pH and Specific Conductance. Permit Condition IV.D.
13. Lockwood does not employ or report the statistical procedures of Permit Condition IV.G.
14. Failure to monitor during September - November, 1992. Permit Condition IV.H.1.

The actions giving rise to the above violations, if continuing, should cease immediately. You are required to submit documentation of all corrective actions taken and as appropriate, a schedule of corrective actions planned within 30 days of receipt of this letter. See the Recommendation section of this report.

Be advised that meeting the above requirements does not prevent the Department from pursuing appropriate enforcement actions, including penalties, for violations noted during the inspection. For your reference, statutory authority for such penalties is found at Neb. Stat. §81-1508.

If you do not have copies or access to the regulations, please contact Robert J. Tobin at (402) 471-4217.

Respectfully,

  
Bill Imig  
Supervisor  
RCRA Section  
Air and Waste Division

BI/RJT/ta

Enclosures

xc: Lyndell Harrington, U.S. EPA Region VII

Lockwood Corporation

NED044101442

Operations and Maintenance Inspection (OMI)

March 31, 1994

Robert J. Tobin, CPG #7474

Nebraska Department of Environmental Quality

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## Operations and Maintenance Inspection (OMI)

Lockwood Corporation

NED044101442

SW1/4, SE1/4, Sec. 1, T. 21N, R. 55W, 6th P. M.  
Scotts Bluff County, Nebraska

### A. Introduction

#### I. General Background

Lockwood Corporation is a Nebraska corporation engaged in the manufacture of dump truck body hoists, pumps, hydraulic cylinders, truck bodies, center pivot irrigation systems, potato harvesters, and potato planters. Manufacturing processes include machining, forging, welding, galvanizing, fabrication, phosphatizing, painting, and assembly. Hazardous wastes generated include spent pickle liquor (D002, formerly K062), waste acid sludge (D002), waste caustic sludge (D002), waste petroleum naphtha (D001), waste MEK, xylene, and toluene solvents (F003/F005), and waste paint sludges (F003/F005/D001).

Formerly, Lockwood disposed of spent pickle liquor in either of two surface impoundments, now closed. Galvanizing operations commenced during 12/72; an estimated 1.40 to 2.24 million gallons of spent pickle liquor were pumped into the impoundments. Use of these lagoons ceased during 6/84 as a result of an NDEC Administrative Order.

#### II. Chronological Summary of RCRA Enforcement

6/20/84	Administrative order
10/8-10/85	10 RCRA wells installed
2/21/86	LOW
7/9/86	Closure and Post-Closure Plans approved
4/10/86	Split sampling event
9/30/86	CME
2/19/87	Lockwood submits GWM guidelines
12/24/87	(EPA) RFA Draft Sampling Plan
12/9/88	(EPA) RFA
6/89	OMI
9/20/89	Post-Closure Permit
11/1/89	Complete Post-Closure Permit Application
12/15/89	Lockwood submits RFI draft
3/1/91	Lockwood submits OMI inquiry answers
10/91	Lockwood submits revised RFI
3/18/92	EPA revises RFI
11/10/93	OMI site visit

### III. Regulatory Status

Lockwood is a permitted facility, subject to 40 CFR 264.90 -.98 as a Detection GWM facility.

#### B. GWM Well Designs

1. PVC well stickups within surface protective casing are broken or deteriorated.
2. Contrary to the statement on page 3 of HWS' 12/15/89 RFI document, the wells lack bentonite seals between cement grout and gravel pack. This author observed the well installation.
3. The gravel pack is of 16/40 sand, approx. 85% Qtz, 10% alkali feldspar; 5% mafies.
4. MW-1 through 8 are of nominal 4" O. D. PVC; MI-1 & 2 are of nominal 6" O. D. PVC.
5. All wells are 24-30' deep. See Table VB1-1 of App. Vol 1 #9.
6. The gravel pack allegedly extends roughly 2' above the top of the screen.
7. Well labels are peeling off.
8. Wellhead locks were cut off by Lockwood during the 11/10/93 OMI visit. The keys had been lost.
9. Drilling equipment was not decontaminated between wells during the 10/8-10/85 installations.

#### C. GWM Well Locations and Depths

- I. Locations  
See Appendix 2, #5, 5th page

Lockwood/HWS initially (8/27/84) proposed a four-well monitoring system, but delayed proposal of well locations until submittal of the Hyd. Invest. (11/9/84), Sheet 1 of which proposes one well in the extreme southwestern corner of the plant property about 175 feet SW of the erosion pit in Cell #2, one about 163 feet NW of this same point, one about 200 feet SE, and one about 630 feet NNE to due north.

The reviews of the Hyd. Invest. by an NDEC hydrogeologist (11/21/84) and soil scientist (12/10/84), as well as the 6/21/85 formal response by NDEC to the Hyd. Invest. and Supplemental Report, cited high (0.10 mg/l) chromium and lead (0.05 mg/l) concentrations of Table 4, as well as various apparent peculiarities in data presentation and interpretation. Seven of the ten monitoring well locations suggested by NDEC in the 6/21/85 review are in close proximity to previous boring locations that yielded these high contaminant values in groundwater samples (B-1, 2, 6, 7, 8, 11, 13, 14, 15, and 16). The other three locations are further north, and regionally downgradient, of the site area previously investigated.

Lockwood/HWS's revised proposal of 7/22/85 was also for ten monitoring wells, six locations being essentially identical to NDEC's. Lockwood/HWS preferred to shift one of NDEC's suggested regionally downgradient locations approximately 200 feet east to a position just within its own fenced property boundary. Two 8-inch diameter monitoring/interceptor wells were proposed on opposite sides of the impoundments with a 4-inch diameter monitoring well within 30 feet of each, presumably for convenient piezometric data locations for the anticipated pump test also proposed. Note that these 2 8-inch wells were designed as recovery wells and have never been used.

These locations were reviewed in a telephone conversation of 7/25/85, between Lockwood and NDEC. The Lockwood/HWS locations were approved by NDEC in writing on 8/20/85. Wells were installed at these locations 10/7 - 10/85.

The existing wells virtually surround the impoundment site in a rough in-echelon pattern. Only the southwest direction (regionally upgradient) is uncovered. Most of the wells were intentionally situated to monitor localities that were previously indicated to have high contaminant concentrations in groundwater samples.

The obvious deficiencies of the current monitoring system are: 1) lack of coverage in a regionally upgradient direction; and 2) lack of deeper monitoring of the thick underlying Brule formation, which is generally acknowledged to have aquifer potential.

## II. Depths

See Appendix A of Appendix 2, #1. All 10 wells are completed at the base of the braided stream unit, top of the Brule Formation. Five to 10' of silt/clay overlie this braided stream unit. Screen lengths are all 10'.

These well depths are adequate, unless the Brule is to be monitored.

D. Operations and Maintenance Plan

The 9/20/89 OMI, page 7, includes the following:

Well maintenance activity has heretofore involved only monthly wellhead field inspections. Permit application modifications (9/20/89) indicates a four-fold inspection program:

1. Monthly wellhead area inspection for surface protective casing damage, tampering with the padlocks, cracks in the cement aprons, etc.
2. A yearly well bore scrape sampling of the screen and casing for mineral encrustation and algal growth.
3. Semi-annual recording of well yield during purging, recovery time after purging, and fill depth.
4. A down-hole television survey of any well showing persistent low yield, long recovery or excessive fill.

The 9/29/89 Post-Closure Permit, page 15, includes the following:

The Permittee shall conduct the following maintenance activities:

1. A monthly inspection of the wellhead area for damage to the surface protective casing, lock, or cement apron.
2. A yearly wellbore scrape sampling of the screen and casing for mineral encrustation and algal growth.
3. An annual review of the following measurements to be taken during each sampling event: well yield, recovery time, and fill depth. A well integrity test by an appropriate method, will be conducted contingent upon results of this annual review."

NDEQ has no record that these permit activities have ever occurred. The permit implies that corrective action for any discovered problems would occur. See also App. Volume 1, #10. App. Volume 2, #3 notes:

"The closed hazardous waste unit appeared to be well maintained. Fences were in good condition. Weeds were mowed and all gates were chained and locked.



The point of compliance wells were in good condition. However, some of the labels have begun to peel off and weeds were overgrown around some of them. The locks for the gates and wells had to be cut off because the keys could not be located. As for the rest of the site, there were areas which showed neglect. Weeds were overgrown and broken equipment was being stored in a disorderly fashion. Some of the LW series well barricades had been removed from around the well or knocked over, and parts and stock materials were piled around them (see photos #9-#12)."

#### E. Sampling and Analysis Plan (SAP)

Numerous SAP's have been prepared for this site at different times. All are included in the Appendices. That which is actually in effect is in the Post Closure Permit Application. Unfortunately, this is a very scanty discussion and the most recent sampling crew did not have even this document in hand during the recent OMI sampling event.

The following excerpts and reviews from the various SAP's are included in the NDEQ file for Lockwood:

1. Appendix 1, #1, pages 3-6 -

This is the plan that was in effect at the time of the 1986 CME.

- a. Note that metals are EP Toxicity, not total;
- b. Parameters and frequency are as per 40 CFR 265.92;
- c. Sampling methods are not specified;
- d. Preservation methods are not specified;
- e. Chain-of-Custody methods are not specified.

2. Appendix 1, #2, pages 39-49 -

This is the CME review of the split sampling event.

The following is a description of actual sampling at the time of the CME (1986):

"Sampling proceeded in the following pattern:

1. The metal lid of the surface protective casing and the PVC cap were removed. None of the casings were locked.
2. Fill was tagged by unrolling the coiled aluminum tape measure into the well and withdrawing until tension was felt. Static water level was measured in the same manner.

3. The submersible pump was rinsed with deionized water from the squeeze bottle. This was only done prior to the first well purging. Pump, hose, electric cord, and rope were not rinsed between purgings. Pump rate and duration were recorded. Purged fluid flowed into the bucket and was allowed to spill from the bucket onto the ground. Apparently, the purpose of the bucket was to prevent hose discharge from eroding a hole in the shallow soil and loess alluvium. The time of commencement of purging, and any applicable comments on the color and turbidity of purged water, were recorded.
4. The pump was replaced with the Teflon bailer. Dedicated bailers are not used, the advantage being obviated by the use of one submersible pump. Bailer water samples were drained directly into cups or containers.
5. The S.C./pH meter was calibrated with all three standard fluids (one for S. C. and two for pH) in plastic cups and then two bailing samples in cups were metered and results recorded. The probes were rinsed after calibrating and after each bailing sample.
6. Two 500 ml. brown glass jars were filled; one (phenols) had 2 mls of  $H_2SO_4$  added, the other (pesticides) was not preserved.
7. Four 500 ml, clear glass jars were filled: one (total metals) received 2 mls of  $HNO_3$ , one (nitrates) had 2 mls of  $H_2SO_4$  added, and one (chlorides and sulfates) went unpreserved.
8. Two 40 ml "septa" vials were filled; one (TOC) received .2 ml of  $H_2SO_4$ , and one (TOX) had 1 drop of HCL added.
9. NDEC S.C./pH measurements and chemical sampling and preserving were completed.
10. The PVC and metal caps were replaced immediately upon completion of sampling of each well.

Samples were preserved as noted above and placed in two ice-filled coolers. Note that one set of "duplicate" samples was also taken and preserved in an identical manner to the groundwater samples. This sampling set was of deionized water. The samples were driven by Mr. Kuhlman to Western Laboratories (a subsidiary of HWS) the day after completion of sampling. All samples were labeled with the date, the chemical parameter to be analyzed for, the amount and nature of any preservative employed, and sample number. This number was indexed to the well number in the field notebook.

All of the above data were recorded for each sample both on the jar label and on a chain-of-custody sheet. Receipt of the sample was to be acknowledged by signature of Western Laboratory personnel on the chain-of-custody form."

Note that (p. 52, Recommendation #5.) the CME considers the lack of a SAP to be a deficiency and recommends its submittal.

3. Appendix 1, #3, pages 3-5 -

This document was submitted by Lockwood after its receipt of the CME. Is this a response to CME Recommendation #5? Probably. The following are noteworthy points:

- a. Discussion of maintaining a detailed field log book.
- b. Monthly piezometric readings.
- c. Quarterly sampling through 11/87, then semi-annually.
- d. All of 40 CFR 265.92(b), except Hg, pesticides, radiometrics, turbidity, and bacteria are listed as analytes.
- e. The order of sampling is listed: M-1 to 8, M1 1 & 2, in that order. This seems completely arbitrary relative to the degree of contamination.
- f. Preservations are listed, but analytes for specific bottles are not.
- g. Decontamination of equipment between wells is not noted.

4. Appendix 1, #4, pages 13-26 -

This is the RFA draft SAP. This was available to Lockwood as an example. It contains the following aspects:

- a. Use of Teflon bailers
- b. Clean sampling procedures
- c. Discussion of the order of parameter-sample collection
- d. Detailed blow-by-blow discussion of each step in sampling
- e. Collection of duplicates, trip blanks, equipment blanks
- f. A table of analytes/containers/preservatives/volumes
- g. Extensive discussion of documentation and chain-of-custody

5. Appendix 1, #5, pages 15 & 16

This, the final EPA RFA, cites 2 references that NDEQ does not possess:

- a. "Sampling Visit Work Plan, Lockwood Corporation, Gering, Nebraska (CDM FPC, 1987c)"; and,
- b. "Quality Assurance Project Plan (QAPP) for Performing Sampling Visits of RCRA Facility Assessments for Sites in Region VII" (CDM FPC, 1987a)".

6. Appendix 1, #6, pages 8-13 -

This is the 9/20/89 OMI. Note the equipment list for the Lockwood sampling subcontractor of that time (HWS):

- a. Two suburban vehicles, one containing a generator (Powermate PM 4500 electric generator for the submersible pump), and a large distilled water container.
- b. A 50-ft coiled aluminum tape.
- c. A 20-liter deionized water squeeze bottle.
- d. Rubber gloves.
- e. Five-gallon plastic bucket to discharge purged fluid into.
- f. A submersible pump: A 12-50 Aeromotor S.S. with inert plastic impellers (made by Aeromotor Pumps and Well Systems. Conway, AR 72032), with about 750 feet of electric extension

cord, and about 50 ft. of rope (to tie from the well-guard fence to the pump).

- g. A 1 1/4" diameter plastic hose, by Klearcop, attached to the submersible pump and extending about 35-40' up to the bucket.
- h. Specific Conductivity/pH meter (Markson Science, Inc.), temperature compensated, photovolt. The S. C. calibrated at 720 and 2000 micro/cm 25°C (calibrated in the lab prior to the site visit) and checked only with the 2000 solution in the field.
- i. 500 ml Sargent-Welch standard buffer solution pH 10.0, color coded blue, 5-30141-15C, pH 10.18 @ 10°C, 10.11 @ 15°C.
- j. 500 ml Fisher Scientific certified buffer solution pH 7.00 + 0.01 25°C color coded yellow, 50-B-107, pH 7.7 @ 10°C, 7.05 @ 15°.
- k. A 1m-long clear Teflon bailer with ball valve, plastic braided cord (about 50 ft) rolled on a spindle.
- l. 5"-long, plastic, disposable pipettes.
- m. Clear plastic cups: 2 for each well filled from the bailer for the S.C./pH meter; one cup containing each buffer (2); one cup with S.C. calibrating fluid (2000 micro mhos/cm @ 25°).
- n. 500 ml clear plastic jars with Teflon-ringed lids (4/well).
- o. 500 ml brown glass jars with Teflon-ringed lids (2/well).
- p. 40 ml "septa" vials, clear glass (2/well).
- q. 2 large, ice-filled coolers.
- r. glass jar of HNO<sub>3</sub>.
- s. Glass jar of H<sub>2</sub>SO<sub>4</sub>.

The OMI also notes the following modifications noted in the 9/20/89 version of the Post-Closure Permit Application:

- a. Adding an upgradient background well (M-9) to be routinely sampled.

- b. Requiring use of an interface probe and, contingent upon results, a separate disposable bailer.
- c. Use of disposable bailers for all wells.
- d. Recording fill depth prior to purging in all wells.
- e. Recording of well yield and recovery time for each well purged.
- f. Use of the VOC screen and phenol analysis if additional sampling is triggered.
- g. (1990 only) Analysis of the VOC screen, phenols, and total Pb, Cr, and Cd as well as the normally scheduled pH, S.C., TOC, and TOH.

Documentation of the OMI site visit included the following recommendations regarding sampling:

- a. "Tag fill" with plum-bob before purging each well.
- b. Record well yield during purging and also recovery time after purging for each well.
- c. Ensure that water level is measured to the nearest 0.01 foot.
- d. Ensure that samples are taken in the order of volatilization sensitivity and that all holding times are adhered to.
- e. Use an interface probe, prior to purging, to identify any immiscible layers within the well bore.
- f. Use disposable bailers, dedicated Teflon bailers, or dedicated Teflon/s.s. bladder pumps for sampling.
- g. Ensure that any bailer rope, or any wellsite-transferable downhole equipment received both dilute HNO<sub>3</sub>/HCL and distilled water rinses for decontamination.
- h. Ensure that sampling methodology include slow bailer lowering and minimized agitation as well as avoidance of cross-contamination, placing deconned equipment on the ground, etc.

- i. Provide piezometric maps of static water level data along with each analytical report.
- j. Provide an inventory of all sampling equipment describing operation, calibration (if any) and maintenance procedures for each item.

7. Appendix 1, #7, pages 16 & 17

This is the Post-Closure Permit. Procedures outlined here:

"IV.E. SAMPLING AND ANALYSIS PROCEDURES

The Permittee shall use the following techniques and procedures when obtaining and analyzing samples from the groundwater monitoring wells described in PERMIT CONDITION IV.B., above. The sampling and analytical procedures must provide a reliable indication of the quality of the groundwater below the facility pursuant to Title 128, Chapter 21, Section 001 (40 CFR 264.97(d) and (e)).

V.E.1. Samples shall be collected using the techniques described in Attachment IV.

- IV.E.1.a.
  - 1. A disposable bailer shall be lowered to the uppermost fluid interface prior to purging and, if an immiscible layer is visually detected, it will be sampled thereafter with a separate disposable bailer and analyzed using EPA Method 624.
  - 2. A flat-bottomed, inert plum-bob will be lowered to the effective total depth of the wellbore prior to purging and this depth recorded.
  - 3. Any practical well yield indications during well purging should be recorded.
  - 4. Well recovery time after purging should be recorded to the nearest half minute. This will entail continuous use of an electronic tape.

- IV.E.2. Samples shall be preserved and shipped (when shipped off-site for analysis), in accordance with the procedures specified in Attachment IV.
- IV.E.3. Samples shall be analyzed in accordance with the procedures specified in Attachment IV, and as outlined at STANDARD CONDITIONS I.D.9.2., above.
- IV.E.4. Samples shall be tracked and controlled using the chain-of-custody procedure outlined in Attachment IV.

IV.F. ELEVATION OF THE GROUND WATER SURFACE

The Permittee shall determine the elevation of the groundwater surface at each well each time the groundwater is sampled in accordance with PERMIT CONDITION IV.b.2., above (Title 128, Chapter 21, Section 001 (40 CFR 264.97(f)))."

Note the above references to an Attachment IV. This is the Post Closure Permit Application. Special one-time-only analysis are listed in PERMIT CONDITIONS IV.D.1. and 2. More on these later.

8. Appendix 1, #8, pages 3 & 4 -

This is the Post-Closure Permit Application. Although this is referred to in the Permit as Attachment IV, it post-dates the permit: the Permit was signed on 9/29/89; the only existing Application is date-stamped 11/1/89.

The Application includes the following:

"Sampling and Analysis Plan

Samples will be obtained from the groundwater monitoring system on a regular schedule and be stored, transported, and analyzed under accepted scientific procedures and EPA methodology. Monitoring data will be maintained readily available on-site and summarized in a tabular format for easy reference. Transmittal of results to the State and Regional Administrator will be done in accordance with 40 CFR 264.94.

- a. Monitored Parameters Analysis of samples will be performed for the following parameters.
  - i. Parameters establishing groundwater quality:  
chloride  
sulfate



- iron
- manganese
- ii. Parameters used as indicators of groundwater contamination:
  - pH
  - specific conductance
  - total organic carbon
  - total organic halogen

b. Sampling Frequency

- i. For each indicator parameter specified in (ii) above, four replicate measurements will be obtained for each sample. Background arithmetic mean and variance will be determined by pooling the replicate measurements.
- ii. Samples will be collected semi-annually for analysis of parameters listed under (i) and (ii) above.
- iii. Samples will be taken from monitoring wells M-3, M-4, M-6 and M-7 only.

c. Sample Collection

To ensure that standard and consistent methods are used to collect representative samples, the HWST analytical plan begins with the sample collection process. Methods of sample identification, containment and preservation are in accordance with 40 CFR Part 136, Federal Register, October 26, 1984. All sample collection and field analytical procedures are documented in a hardback, bound field notebook. Sampling and preservation procedures are covered in Table 8."

Note that no specific sample collection techniques are discussed. Note also the "a. Monitored Parameters" above does not correspond to Permit Condition IV.D. The latter is only the 4-parameter list a. ii above: pH, specific conductance, TOC and TOX.

9. Appendix 2, #1, pages C-6 through C-11

This is the 10/91 RFI (workplan?). This does not directly pertain to the Post-Closure Permit sampling.

This document contains significant discussion of equipment calibration and sampling as well as QA blanks. The sampling portion requires Hnu

headspace readings, accurate piezometric readings, a pre-calculated purge amount, and clean, careful bailer sampling. This is a discussion superior to that in the Post-Closure Permit Application (referenced above).

10. Appendix 2, #3, pages (unnumbered after 13, but presumably the same numbering scheme continues) 20, 21, 24, and 32-38 -

This is the EPA-modified RFI (workplan?). Again, this is not directly applicable to the routine Post-Closure Permit GWM sampling.

This sampling includes analyses for:

VOCs	As <sup>+</sup>	Pb <sup>+</sup>
TRPH	Cd <sup>+</sup>	Mn <sup>+</sup>
nitrate	Cr <sup>+</sup>	Ni <sup>+</sup>
sulfate	Cu <sup>+</sup>	Ag <sup>+</sup>
total cyanide	Fe <sup>+</sup>	Zn <sup>+</sup>

= total recoverable

These are included along with SW 846 Methods and detection limits in Table 6.4.

In the detailed discussion, pages 32-38, EPA adds portions dealing with sampling for an immiscible layer, purging stabilization criteria, containers/analytical preservatives/holding times, duplicates, and equipment and trip blanks.

11. Appendix 2, #3 -

This is the NDEQ observer's (Mr. Lance Penfield's) report of the 11/10/93 OMI sampling event. The following comments critique the consultant's procedure:

- a. The Environmental Services (ENSR) samples had no knowledge of a Lockwood SAP.
- b. Chain-of-custody forms were not used during sampling.
- c. The only well sampled for VOC's (M-4) was sampled from the top of the water column, the well being unpurged at that time.

- d. Between wells the submersible pump, hose, and electrical cord were thrown into the back of the pickup truck and transported to the next well.
- e. Purge water was allowed to flow onto the ground near the wells.
- f. No water level monitoring, purging, or sampling equipment was decontaminated between wells, nor is there any reason to believe that it came on site initially decontaminated.
- g. Turbidity values were not determined.
- h. Neither the newly-opened wells' headspace, nor the purge water were screened with a PID or FID.
- i. The purge/sampling submersible pump was not calibrated the day of the sampling.
- j. Sample container labels are not secured with tape.
- k. The sampling truck was parked on the closed impoundment cap.

The ENSR sampling equipment in use on 11/10/93 consisted of:

- a. Hach-brand electronic water level, steel, teflon-coated tape marked to 1/100th of a foot
- b. Goulds-brand 1/2 hp 10ES 4-inch submersible impeller pump
- c. 1-inch diameter, mesh-reinforced, polypropylene hose
- d. 3-wire electrical extension cord
- e. gasoline-powered Wisconsin Roben 10-hp portable generator, 20 amp AC
- f. Voss brand disposable bailer w/VOC sampling attachment, and line
- g. nitric acid
- h. 500 ml brown glass jars
- i. 500 ml plastic bottles

- j. pH meter
- k. conductivity meter
- l. pH standard fluids
- m. plastic gloves
- n. labels

In general, although no sufficiently-detailed SAP exists for Post-Closure Permit GWM, still numerous SAP's or detailed critiques have been produced. Lockwood's current samplers have none of these documents and are performing in the dark, doing a marginal job.

#### F. Piezometric Results

Appendix 2, #3, last page and #5, Attachment D contain all piezometric results for the four Point of Compliance wells (MW-3, 4, 6, & 7).

Consider the hydrograph in #5. It is apparent that wells 4 and 7 are closely linked, as are wells 3 and 6, with 4 & 7 being piezometrically below (downgradient) of 3 & 6.

Note that the 3/31/92 data deviate from this trend in that MW-7, commonly one of the two lowest (downgradient) wells, at this time is the highest. This had never occurred before.

Given the data recorded by NDEQ in #3 and the table in #5, Attachment A, the 11/10/93 piezometric data are as follows:

Well	DTW	T/casing	WT elev'
MW 3	9.44	81.02	71.58
MW 4	9.52	80.28	70.76
MW 6	8.75	80.73	71.98
MW 7	9.45	80.46	71.01

\* = add 3800' in each case

Note that 4 and 7 are the lowest (downgradient) wells, 4 being lower. MW-6 is the highest piezometrically. This is consistent with past data.

#5, Figure 2-1 is a piezometric map. This map is consistent with recent data, except that of 3/31/92. This latter data is assumed to be erroneous.

Note within #3 that the NDEQ observer found no surveyed mark on any of the wells from which the measure water level. Note also the shattered PVC wellhead seen in photo #17.

Given the obvious crudity of the piezometric measurements, it is questionable whether more than a gross piezometric trend can be established.

Note, however, that MW-8 is more upgradient than either MW-3 or MW-6, and also that a well positioned south of MW-8 would be even further upgradient.

The Permit Application (Appendix 1, #8, Attachments XI-a-d) show MW-6 as the upgradient well, and yet during 3/27/90, 9/28/90, 4/8/91, 3/31/92, and 4/12/93 this was not the case. MW-3 was upgradient then.

#### G. Chemical Results

Immediately after completion of the last OMI (9/20/89), the site shifted to Permit Status (9/29/89). The routine analysis required by the permit consisted of:

<b>List 1*:</b>	pH	<b>List 2**:</b>	chloride
	SC		sulfate
	TOC		iron
	TOX		manganese

\* Permit Condition IV.D.

\*\* 11/1/89 Permit Application, page 4 a.i.

Note that none of List 2 are parameters within 40 CFR 264, Appendix IX. Note also that none of the parameters have MCL's.

Triggering into Compliance GWM would depend upon exceeding background values, and yet it is questionable which of the 4 POC wells is the upgradient well (see Section F above).

Note that Permit Condition IV.D.1. requires that the 8/89 sampling also include the following analytes:

**List 3**

- |                     |                      |
|---------------------|----------------------|
| 1. Method 624 VOC's | 7. total Hg          |
| 2. phenols          | 8. total Se          |
| 3. total As         | 9. total Ag          |
| 4. total Ba         | 10. fluoride         |
| 5. total Cd         | 11. nitrate-nitrogen |
| 6. total Pb         |                      |

Appendix 1, #6, last table, indicates that the POC wells were not analyzed for nitrate-nitrogen. The table does not include fluoride or VOC's. The NDEQ file (GWM #1) contains the laboratory results of this sampling, dated 11/27/89. These contain the VOC GC/MS scans, but not the fluoride or nitrate. The scans were all clean, below detection levels. Of the given data, Ag in MW-7 yielded 0.090 mg/l. The MCL is 0.05 mg/l.

This should have triggered Permit Condition IV.D.2. (Appendix 1, #7, page 16):

"If one time sampling events for metals, VOCs, and phenols, indicate presence of contaminants, additional sampling will be required and an additional 5' of unweathered core sample of the Brule Formation, upgradient, shall be required in order to determine if the Brule Formation is an aquitard, aquiclude, or aquifer."

This coring has never occurred.

The RFI efforts resulted in sampling of MW-1, 4, 5, and 8 on 5/12/92. See Appendix 2, #4.

	MW-1	MW-4	MW-5	MW-8
sulfate	853	995	185	194
Nitrate-N	9.7	22	3.8	0.59
As, total	BDL	BDL	0.018	0.016
Cd, total	BDL	BDL	0.007	0.002
Cu, total	0.02	BDL	0.06	0.05
Zu, total	0.30	0.22	0.02	0.01
Fe, total	1.0	0.4	0.2	BDL
Mn, total	0.78	2.5	0.08	0.09

All units are in mg/l.

GC/MS VOC analyses were all clean.

The second round of RFI sampling involved MW-1, 3, 4, 5, 6, 7, and 8. This sampling occurred on 4/12-13/93. Results are in Appendix 2, #5, Tables 2-1 and 3-1.

	SO <sub>4</sub>	Cl	Fe	Mn	TOC	TOX	NO <sub>3</sub>	
MW1	1,400	NA	4.4	2.0	NA	NA	2.3	Table 2-1
MW3	320	24	2.3	0.69	3	BDL	NA	Table 3-1
MW4*	1100	420	0.9	2.7	4	20 ug/l	NA	Table 3-1
MW5	140	NA	BDL	0.02	NA	NA	3.3	Table 2-1
MW6	330	27	2.7	0.39	3	BDL	NA	Table 3-1
MW7	340	39	BDL	BDL	3	30 ug/l	NA	Table 3-1
MW8	260	NA	BDL	0.03	NA	NA	5.9	Table 2-1

All results are in mg/l.

NA = not analyzed

\* 15 ug/l Tetrachloroethene found; only MW-4 was analyzed for Method 8240 GC/MS.

Appendix 2, #6 is a GWM report from the 11/10/93 sampling of the POC wells (MW-3, 4, 6, and 7) for TOC, TOX, total Fe, total Mn, and GC/MS VOC's (MW-4 only).

### Post-Closure Permit GWM Results

	TOC	TOX	Fe	Mn	VOCs
MW-3	4.4	0.02	0.792	0.415	
MW-4	5.9	0.019	0.196	2.47	ND
MW-6	4.4	0.025	0.531	0.231	
MW-7	4.3	0.016	0.033	BDL	

All results are in mg/l.

The table at the back of #6 shows all results from the Post-Closure Permit GWM.

	MW-3	MW-4	MW-6	MW-7
pH (S. U.)	7.1 - 7.6	6.7 - 7.2	7.1 - 7.6	7.0 - 7.5
S C (um/cm)	950 - 1800	2650 - 6450	995 - 1500	992 - 1500
total Fe	5.00 - .79	0.2 - 9.0	0.3 - 2.7	ND - 0.60
total Mn	0.69 - 0.23	0.92 - 3.6	0.19 - 0.39	ND - 0.04
SO <sub>4</sub> <sup>=</sup>	309 - 360	1100 - 3600	230 - 330	180 - 340
Cl <sup>-</sup>	19.0 - 42.0	27.0 - 420.0(?)	18.0 - 57.0	20.0 - 39.0
TOC	3.0 - 17	4.0 - 35	ND - 14	2.2 - 22.0
TOH (ug/l)	ND - 20	ND - 42	ND - 32	ND - 50

Unless noted, all units are in mg/l.

The background values for the Post-Closure Permit analytes are those presented in Appendix 1, #8, Table 9. Note that this includes only TOC and TOX.

It appears that all four POC wells have apparently exceeded TOC background values significantly and that MW-7 has also exceeded its TOX (TOH) background.



## H. Conclusions and Recommendations

### 1. Conclusions

- a. The monitoring wells lack bentonite seals
- b. Well installation may have caused cross-contamination since no drilling equipment decon occurred between wells.
- c. Well number labels are peeling off. Violation of Permit Condition IV.B.
- d. The threaded portion of the PVC stick-up, of at least one well, is broken. Violation of Permit Condition IV.B.
- e. The current GWM system lacks clearly defined upgradient wells. MW-8 is more upgradient than neither MW-6 or -3. An MW-9 could be drilled south of MW-8 and be in a more certainly upgradient position. This would fulfill Permit Condition IV.B.1.a.
- f. Permit Condition IV.B.2.a. (requiring monthly wellhead inspections, annual wellbore scrape sampling, and annual review of well yield, recovery time, and fill depth) has not been implemented, or these activities have not been documented.
- g. The Sampling and Analysis Plan (SAP) referenced by Permit Condition IV.E.1. is that in the Permit Application (Appendix 1, #8, pages 3 and 4). No specific sampling procedures are outlined, nor do the analytes listed correspond to those in Permit Condition IV.D. Specific items desirable in an acceptable SAP are discussed in Section E. 2, 4, 6, and 10.
- h. Piezometric maps have not been routinely submitted along with the semi-annual GWM results.
- i. None of the POC GWM wells have survey marks to indicate the elevation from which depth-to-water readings should be measured.
- j. The 8/89 sampling event did not include analysis for nitrate-nitrogen or fluoride. This is a violation of Permit Condition IV.D.1.
- k. The 8/89 results yielded a silver value in MW-7 above the MCL, which by Permit Condition IV.D.2. should have resulted in coring of 5' of the Brule Formation. This did not occur.

- I. Permit Condition IV.E.1.a.1 requires use of a disposable bailer to sample the top of the water column for immiscible analysis. This is not currently done at Lockwood, nor is there any indication that it has ever been done.
- m. Permit Conditions IV.E.1.a.3 and 4 require that well yield and recovery time data be recorded during and after purging. This has not been done.
- n. Chain-of-custody documents are not completed during sampling. This is a violation of Permit Condition IV.E.4.
- o. The background values referenced in Permit Condition IV.D. are for TOC and TOX only, not also for pH and Specific Conductance as stated in the permit.
- p. cursory examination of TOC and TOX values for POC wells during the Permit period to date suggest that all 4 wells may have triggered for TOC and MW-7 may have triggered for TOX. This suggests that the statistical procedures of Permit Condition IV.G. have been violated.
- q. Lockwood violated Permit Condition IV.H.1. by failing to monitor semi-annually during 1992. Sampling should have occurred during Sept. - Nov. of that year.
- r. The two RFI sampling events have shown exceedances of MCL's for nitrate-nitrogen and cadmium and of secondary MCL's for sulfate, iron, manganese, and chloride. Post-Closure Permit GWM confirms the latter, secondary MCL, exceedances.
- s. The only specific VOC that has been found on site has been PCE (15 ug/l) in MW-4 during the second RFI sampling, 4/12-13/93. Resampling of MW-4 for VOC's during the 11/10/93 sampling event yielded nothing. The 9/25/89 VOC analysis had also yielded nothing.

## II. Recommendations

- a. Lockwood should submit an Operations and Maintenance Inspection (OMI) Plan correcting the deficiencies noted in Conclusions c, d, f, and i.

- b. Lockwood should submit a Sampling and Analysis Plan (SAP) correcting the deficiencies noted in Conclusions e, g, h, l, m, n, and o.
- c. A new well MW-9 should be installed south of MW-8, on site, to serve as the upgradient well.
- d. In accordance with Permit Condition IV.D.1., nitrate-nitrogen and fluoride should be added to the analyte list of the next round of GWM sampling.
- e. The top 5' of the Brule Formation should be continuously cored and analyzed for all chemical analytes of interest as well as permeability, in accordance with Permit Condition IV.D.2.
- f. Lockwood should conduct the statistical analysis of Permit Condition IV.G. on all past GWM data during the Post-Closure Permit period and determine if it has triggered into Compliance GWM.